

Application Number 10/771,641
Response to Office Action mailed January 10, 2008

REMARKS

This Amendment is responsive to the nonfinal Office Action dated January 10, 2008. Applicant has amended claims 1, 2, 4, 7, 11, 24, 26, 29, 37, 39, 41, 43, 60, 62, 65, 73, 75, 77 and 79, and added claims 83-86. Claims 1-86 will be pending upon entry of the Amendment.

Amendments to the Specification

Applicant has amended paragraph [0057] of the originally-filed disclosure in order to add further description of FIG. 5. No new matter has been added. Support for the amendment to the specification may be found throughout Applicant's originally-filed disclosure, including FIG. 5. For example, FIG. 5 as originally filed shows a distal planar guide 84, a mesial planar guide 86, and an occlusal planar guide 88 that are displayed while the digital representation of tooth 82 is also displayed. Moreover, FIG. 5 as originally filed clearly illustrates that the planar guides 84, 86 and 88 are displayed separately from the digital representation of the tooth 82 and that the planar guides lie in different planes.

Claim Rejection Under 35 U.S.C. § 112, first paragraph

In the Office Action, claims 38 and 74 were rejected under 35 U.S.C. § 112, first paragraph on the premise that Applicant's specification does not reasonably provide enablement for a sheath, a button or an archwire. According to the Office Action, "[t]he specification does not describe the planar guide(s) rendered for these appliances and how the planar guide(s) aid the practitioner in placement of such appliances."¹ Applicant respectfully disagrees and submits that claims 38 and 74 meet the limitations of 35 U.S.C. § 112, first paragraph.

As an initial matter, Applicant submits that the Office Action has failed to meet the burden of establishing a reasonable basis for questioning the enablement of the invention of claims 38 and 74. As provided in MPEP §§ 2161.01 and 2164.04, the Examiner must establish a reasonable basis for questioning the adequacy of the disclosure to enable a person of ordinary skill in the art to make and use the claimed invention without resorting to undue experiments.

The MPEP provides that the burden can be met by providing specific findings and evidence that

¹ Office Action at p. 2.

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led the Examiner to conclude that the specification fails to teach how to make and use the claimed invention without undue experimentation.

In the present case, however, the Office Action merely provides a conclusory statement to support the rejection of claims 38 and 74 under 35 U.S.C. § 112, first paragraph. According to the Office Action, because the specification does not describe how planar guides are rendered for a sheath, button or archwire, or how the planar guides may aid in placement of such appliances, Applicant's specification fails to enable claims 38 and 74. Applicant respectfully submits that the conclusory statement offered by the Office Action does not provide a reasonable basis for questioning the adequacy of Applicant's disclosure with respect to enablement. Moreover, based on the details provided in Applicant's disclosure, such as the operation of modeling software that may generate a planar guide,² a person of ordinary skill in the art would be able to make and use the claimed invention without resorting to undue experimentation.

Specifically, the Office Action alleged that Applicant's specification does not describe how the planar guides are rendered for a sheath, a button or an archwire. Applicant respectfully disagrees. While the specification primarily refers to a bracket, the specification also makes clear that the techniques described therein may be applied to positioning and orienting other types of orthodontic appliances.³ Applicant need not separately illustrate rendering of each different type of orthodontic appliance to comply with the enablement requirement of 35 U.S.C. § 112, first paragraph.⁴

To be clear, Applicant's specification provides details regarding how a planar guide may be rendered relative to different surfaces (e.g., a midlateral plane, midsagittal plane, etc.) of an orthodontic appliance, and, in some cases, different surfaces of a tooth (e.g., a occlusal surface or a gingival edge of a tooth)⁵. In addition, Applicant's disclosure provides that modeling software may generate a planar guide within a 3D environment based on a coordinate system associated with a bracket, thereby enabling the modeling software to automatically adjust the 3D location and orientation of the planar guides as the practitioner adjusts the bracket with respect to the

² See, e.g., Applicant's originally-filed disclosure at paragraph [0063].

³ *Id.* at paragraph [0063].

⁴ MPEP § 2164.02.

⁵ Applicant's originally-filed disclosure at paragraph [0031].

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tooth.⁶ Regardless of a structure of the orthodontic appliance, e.g., whether the orthodontic appliance is a bracket or a button, the present application makes clear that a coordinate system may be associated with the appliance.

These details regarding use of planar guides to assist in the positioning of brackets may be applied by one skilled in the art to generate planar guides that assist a practitioner in positioning orthodontic appliances other than brackets without undue experimentation. For example, Applicant's disclosure describes a mesial planar guide that may be rendered parallel to and equidistant from a midsagittal plane of a bracket being placed. A sheath, button, and archwire may have a midsagittal plane, which is a well-known term that refers to a plane that divides an object into right and left halves.⁷ Thus, one skilled in the art would recognize that the mesial planar guide may be rendered parallel to the midsagittal plane of the respective orthodontic appliance. As another example, Applicant's disclosure describes a distal planar guide that penetrates a distal edge of a digital representation of a tooth.⁸ Thus, regardless of the type of orthodontic appliance, one skilled in the art would recognize that a planar guide that penetrates a distal edge of a tooth may also be rendered to aid in the placement of the orthodontic appliance relative to a digital representation of the tooth.

The Office Action also questioned how the planar guides aid the practitioner in placement of a sheath, button, and archwire. However, the disclosure related to brackets in Applicant's disclosure indicates how planar guides may aid the practitioner in placement of a sheath, button, and archwire. Planar guides associated with a bracket may assist a practitioner in achieving proper appliance placement of a bracket according to anatomical features of the teeth.⁹ Just as midlateral, midfrontal, and midsagittal planar guides associated with a bracket may be useful in dissecting the tooth and visualizing cross-sections of the tooth,¹⁰ midlateral, midfrontal, and midsagittal planar guides associated with a sheath, a button or an archwire may be useful in dissecting the tooth and visualizing cross-sections of the tooth. For example, in some embodiments, the planar guides may allow a practitioner to precisely position and orient a

⁶ *Id.* at paragraph [0023].

⁷ See, e.g., http://www.biology-online.org/dictionary/Midsagittal_plane and http://en.wikipedia.org/wiki/Sagittal_plane.

⁸ Applicant's originally-filed disclosure at paragraph [0057].

⁹ *Id.* at paragraph [0034].

¹⁰ *Id.* at paragraph [0033].

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bracket on a tooth by effectively framing a tooth. In particular, the planar guides may help position the bracket relative to a perceived midsagittal plane of a tooth or an occlusal plane of a dental arch.¹¹ One skilled in the art would recognize that the anatomical features of a tooth may also be important to identify for placing a sheath, a button or an archwire relative to a dental arch.

As described in Applicant's disclosure, a planar guide generally visually aids a practitioner in the placement of an orthodontic appliance within a 3D environment by helping the practitioner visually determine the distance between the planar guide and other objects within the 3D environment, such as a surface of a tooth. Regardless of the type of orthodontic appliance, an indication of the relative positioning between a planar guide and an object within a 3D environment may be beneficial. No undue experimentation is necessary to determine how a planar guide may provide a visual aid to a practitioner in the placement of sheath, button or archwire within a 3D environment.

Based on Applicant's disclosure, one skilled in the art would be able practice a method that includes displaying a planar guide within a 3D environment as a visual aid to a practitioner in the placement of a sheath, button, and archwire relative to a digital representation of a dental arch without undue experimentation. Similarly, one skilled in the art would be able to make and use modeling software that includes a user interface that displays a planar guide within a 3D environment as a visual aid to a practitioner in the placement of a sheath, button, and archwire relative to the dental arch without undue experimentation. For at least these reasons, Applicant's specification enables claims 38 and 74. Reconsideration and withdrawal of the rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. § 112, second paragraph

In the Office Action, claims 1-38, 44-50, 64, 66, and 78 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Office Action stated that recitation of "the planar guide" lacks sufficient antecedent basis, and "[i]t is not clear as to what is a midsagittal plane, a midlateral plane, a midfrontal plane, occlusal-gingival axis of

¹¹ *Id.* at paragraph [0032].

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the *orthodontic appliance*.¹² Applicant has amended independent claims 1 and 4 to provide antecedent basis to “the planar guide” recited therein. Applicant submits that claims 1 and 4, as amended, particularly point out and distinctly claim the subject matter, as required by 35 U.S.C. 112, second paragraph.

With respect to the latter basis for the rejection of claims 1-38, 44-50, 64, 66, and 78 under 35 U.S.C. § 112, second paragraph, Applicant notes that only claims 5-11, 28, 30, 44-50, 64, 66, and 78 recite midsagittal plane, a midlateral plane, a midfrontal plane, occlusal-gingival axis of an orthodontic appliance. Applicant respectfully maintains that the claims as originally presented are definite and meet the requirements of 35 U.S.C. § 112, second paragraph.

Claims 5-11, 30, 44-50, 64, and 78 each recite at least one of a midsagittal plane, midlateral plane or a midfrontal plane of an orthodontic appliance. In addition, claims 28, 30, 64, and 66 recite an occlusal-gingival axis of an orthodontic appliance. These recited claims terms have well-known meaning in the art and are used consistent with their ordinary meanings throughout Applicant’s originally-filed disclosure.

In the Response to Arguments, the Office Action alleged that because the claim terms “midsagittal,” “midlateral,” “midfrontal,” and “occlusal-gingival axis” are not ordinarily used to describe orthodontic appliances, the scope of the claims is unclear.¹³ Applicant respectfully disagrees. Even assuming that the claim terms midsagittal,” “midlateral,” “midfrontal,” and “occlusal-gingival axis” are not “used in dentistry”¹⁴ according to the meanings attributed to the terms by Applicant, an assertion with which Applicant does not agree, the scope of claims 5-11, 30, 44-50, 64, and 78 is nevertheless clear in view of Applicant’s disclosure, such as at paragraphs [0054] to [0062] and FIGS. 4-16, which describe and illustrate these various types of planar guides.

The Office Action further implied that Applicant is defining a midsagittal plane, a midlateral plane, a midfrontal plane, occlusal-gingival axis contrary to their ordinary meanings.¹⁵ For at least the reasons described in further detail below, Applicant submits that the claim terms midlateral plane, a midfrontal plane, and occlusal-gingival axis are not used contrary to their

¹² Office Action at p. 2 (emphasis in original).

¹³ *Id.*

¹⁴ *Id.*

¹⁵ *Id.* at p. 5, item 10.

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ordinary meanings. Instead, Applicant has used the terms in a manner that is consistent with their ordinary meanings.

For example, a "midsagittal plane" is well-known to be a plane that divides an object into right and left halves.¹⁶ "Midsagittal plane" is used in a consistent manner with this well-known definition throughout Applicant's originally-filed disclosure. For example, the disclosure states that, "a midsagittal planar guide may be rendered parallel to a midsagittal plane of the bracket."¹⁷ A bracket is a type of orthodontic appliance.¹⁸ As FIG 10 (copied below) illustrates, midsagittal plane of the bracket, which is parallel to the midsagittal planar guide 98, is a plane that divides the bracket into left and right halves.

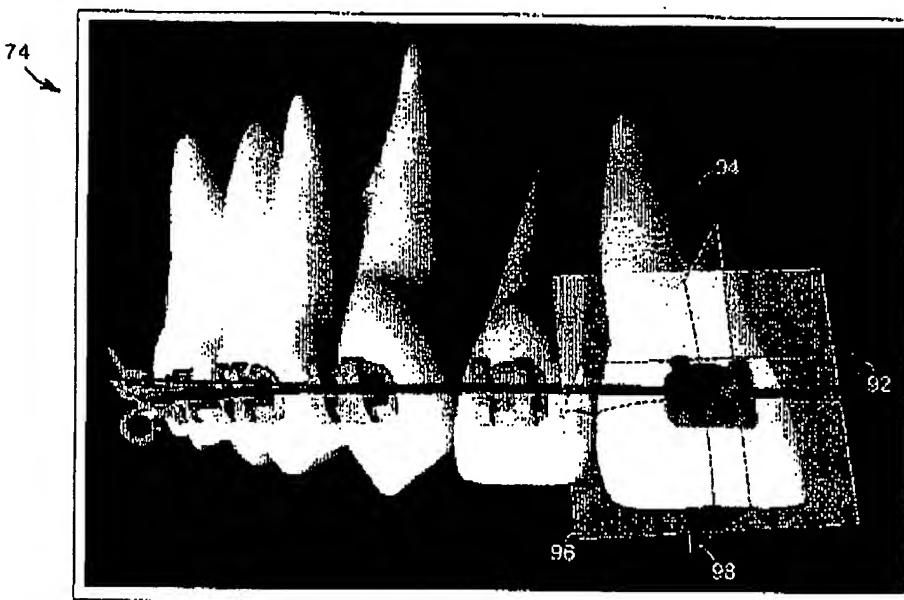


FIG. 10

Applicant's disclosure also states that a mesial planar guide and a distal planar guide are rendered parallel to the midsagittal plane of the bracket being placed.¹⁹ A distal planar guide 84 and mesial planar guide 86 are shown in FIG. 5 (copied below). Because the distal planar guide

¹⁶ See, e.g., http://www.biology-online.org/dictionary/Midsagittal_plane and http://en.wikipedia.org/wiki/Sagittal_plane.

¹⁷ Applicant's originally-filed disclosure at paragraph [0012].

¹⁸ See, e.g., *id.* at paragraph [0050].

¹⁹ *Id.* at paragraph [0010].

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84 and mesial planar guide 86 are rendered parallel to the midsagittal plane of the bracket 80,²⁰ the midsagittal plane of the bracket 80 must necessarily extend in the same direction as the distal planar guide 84 and mesial planar guide 86, i.e., substantially along a direction that bisects the bracket 80 into left and right halves, as is the ordinary meaning of "sagittal." Regardless of the structure of the orthodontic appliance, a midsagittal plane of the orthodontic appliance remains the same, i.e., a plane that divides the orthodontic appliance into right and left halves. For at least these reasons, the claim term, "midsagittal" is clear from Applicant's disclosure.

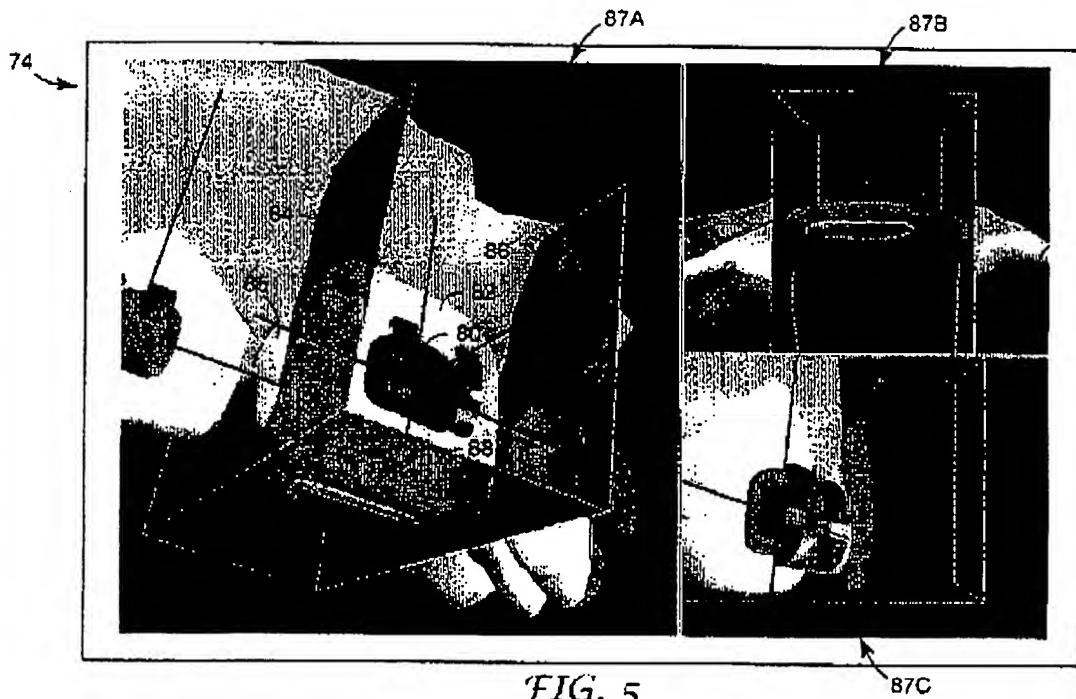


FIG. 5

The Office Action alleged that because Applicant "argues by applying the terminology with respect to an orthodontic bracket which is only shown to be rectangular, and does not apply it to other types of orthodontic appliances such as a sheath," Applicant's use of "midsagittal plane" is unclear. The Office Action appears to be applying an incorrect standard for determining whether the claims meet the limitations of 35 U.S.C. § 112, second paragraph. Claims 5, 6, 10, 30, 44, 45, 49, 66, and 78 generally refer to a midsagittal plane of an "orthodontic appliance." In the explanation of "midsagittal" above, Applicant applied the claim term, "midsagittal," "to a

²⁰ *Id.*

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bracket to explain how the claim terms are definite. Even if Applicant does not explicitly describe how other types of orthodontic appliances may define a midsagittal plane, as the Office Action apparently requires, one skilled in the art would recognize the metes and bounds of claim 5, 6, 10, 30, 44, 45, 49, 66, and 78.

Similarly, the ordinary and well-known meaning of "lateral" is being situated at, proceeding from, or directed to a side.²¹ Thus, a "midlateral plane" is commonly used to describe a plane that bisects the middle of an object in a sideways direction. Applicant has used the term "midlateral plane" throughout Applicant's originally-filed disclosure in a manner that is consistent with this well-known definition. For example, the disclosure states that, "a midlateral planar guide . . . is rendered parallel to the midlateral plane of the bracket being placed."²² FIG 10 illustrates a midlateral planar guide 92 that is "rendered within the midlateral plane of tooth 94." The midlateral planar guide 92 is shown as extending from one side of the tooth 94 to the other. Accordingly, the midlateral plane of the bracket, which is parallel to the midlateral planar guide 92²³, also extends in the same direction as the midlateral planar guide 92.

Applicant's disclosure also states that "an occlusal planar guide . . . is rendered parallel to the midlateral plane . . . of the bracket" and that the occlusal planar guide penetrates an occlusal surface of a tooth.²⁴ FIG 5 illustrates an occlusal planar guide 88, which also extends from one side of a tooth to another and penetrates an occlusal surface of a tooth. Thus, the midlateral plane of the bracket must also extend from one side of a tooth to another. For at least these reasons, the claim term, "midlateral" is clear, even if the structure of the orthodontic appliance is not explicitly recited in claims 7, 8, 11, 46, 47, 50, and 78.

Similarly, the ordinary and well-known meaning of frontal" is at the front, in the front or front of an object.²⁵ Thus, a "midfrontal plane" is a plane that extends midway between the front and back of an object. Applicant has used the term "midfrontal plane" throughout Applicant's originally-filed disclosure in a consistent manner with this well-known definition. For example, the disclosure states that, "a midfrontal planar guide may be rendered parallel to the midfrontal

²¹ See, e.g., <http://dictionary.reference.com/browse/lateral>.

²² Applicant's originally-filed disclosure at paragraph [0033].

²³ *Id.*

²⁴ *Id.* at paragraphs [0033] and [0057].

²⁵ See, e.g., <http://dictionary.reference.com/browse/frontal>.

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plane of the bracket.”²⁶ In addition, FIG. 10 illustrates a “midfrontal planar guide 96 rendered substantially parallel to a midfrontal plane of tooth 94.”²⁷ As FIG. 10 illustrates, the midfrontal planar guide 96 extends parallel to a front of the bracket, which is also parallel to the midfrontal plane of the tooth 94. For at least these reasons, the claim term, “midfrontal plane” is clear.

Similarly, an “occlusal-gingival axis” of an orthodontic appliance has an ordinary and well-known meaning. When determining whether claim language is definite, the claim language may be analyzed in light of the prior art.²⁸ As noted in Applicant’s previous response, in U.S. Patent No. 7,188,421 to Cleary et al., reference is made to an occlusal-gingival axis of the appliance 34.²⁹ Consistent with Clearly et al., the occlusal-gingival axis of an orthodontic appliance is well-known, and describes an axis that extends in a direction substantially along the occlusal surface of a tooth to which the appliance is coupled to the gingival. Accordingly, the claim term “occlusal-gingival axis” is a definite claim term.

For at least these reasons, Applicant submits that claims 1-38, 44-50, 64, 66, and 78 particularly point out and distinctly claim the subject matter, as required by 35 U.S.C. 112, second paragraph. Reconsideration and withdrawal of the rejection is respectfully requested.

Claim Rejection Under 35 U.S.C. §§ 102(b) and 103(a)

In the Office Action, claims 1-4, 10, 12, 13, 18, 19, 31-35, 37, 38, 39-43, 49, 51-55, 73-78 and 80-82 were rejected under 35 U.S.C. § 102(b) as being anticipated by Chapoulaud et al. (U.S. Patent Application No. 2002/0028417, hereinafter “Chapoulaud”). In addition, claims 5-9, 11, 14-17, 20-28, 36, 44-48, 50, 56-64 and 67-72 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapoulaud, and claims 29, 30, 65, 66 and 79 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Chapoulaud in view of Kopelman et al. (U.S. Patent Application Publication No. 2003/014509, hereinafter “Kopelman”).

Applicant respectfully traverses the rejection of the claims to the extent such rejection may be considered applicable to the amended claims. Chapoulaud, alone or in combination with Kopelman, fails to disclose or suggest each and every feature of the claimed invention, as

²⁶ Applicant’s originally-filed disclosure at paragraph [0012].

²⁷ *Id.* at paragraph [0062].

²⁸ MPEP § 2173.02.

²⁹ U.S. Patent No. 7,188,421 at col. 10, ll. 31-34.

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required by 35 U.S.C. §§ 102(b) and 103(a), and provides no teaching that would have suggested the desirability of modification to include such features.

Independent claims 1, 4, 39, and 75

For example, Chapoulaud fails to teach or suggest a method comprising displaying a digital representation of a tooth of a dental arch within a three-dimensional (3D) environment, and, while displaying the digital representation of the tooth of the dental arch, displaying a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in the placement of an orthodontic appliance relative to the tooth of the dental arch, where the two-dimensional planar guide is displayed separately from the digital representation of the tooth, as recited by Applicant's independent claims 1 and 4 as amended.

In support of the rejection of the claims, the Office Action stated that FIG. 5G and paragraph [0090] of Chapoulaud disclose a planar guide.³⁰ FIG. 5G of Chapoulaud illustrates vector images of teeth, an archwire 80, and brackets 81.³¹ If the Office Action is characterizing the vector images of the teeth as planar guides, Applicant respectfully disagrees that the vector tooth images are planar guides as recited in claims 1 and 4. To be clear, the planar guide recited in Applicant's claims 1 and 4 is displayed separately from any digital representation of a tooth of a dental arch. Applicant has amended claims 1 and 4 to clarify that the method comprises displaying both a digital representation of a tooth of a dental arch and a planar guide within the same 3D environment. That is, according to the methods of claims 1 and 4, a planar guide is displayed within the 3D environment while the digital representation of the tooth of the dental arch within the 3D environment is displayed. Claims 1 and 4 further clarify that the two-dimensional planar guide is separate from the digital representation of the tooth.

Claims 1 and 4 as amended require displaying a two-dimensional planar guide separately from a digital representation of a tooth of a dental arch and while the digital representation of the tooth is displayed within the same 3D environment. That is, claims 1 and 4 require the planar guide to be displayed in addition to a digital representation of a tooth of a dental arch. On the other hand, Chapoulaud merely discloses displaying a digital model of teeth, and fails to disclose

³⁰ Office Action at p. 3, item 6.

³¹ Chapoulaud at paragraph [0091].

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or suggest displaying a two-dimensional planar guide in addition to the digital model of the teeth. The vector images of teeth shown in FIG. 5G of Chapoulaud are not planar guides, but, rather, are the representations of the teeth themselves. For example, Chapoulaud expressly discloses that “the digital model of the teeth includes . . . vector data representations of the teeth,” which are shown in FIG. 5G.³² Even if the Office Action maintains that the vector images of the teeth shown in FIG. 5G are planar guides, a proposition with which Applicant disagrees, Chapoulaud cannot disclose displaying a digital representation of a tooth in addition to and separately from planar guides because the “planar guides” are the digital models of the teeth. Kopelman fails to provide any disclosure or teaching sufficient to overcome the deficiencies of Chapoulaud.

Independent claim 1 also specifies that displaying the planar guide comprises, *as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location that is based on a position of the orthodontic appliance.* Thus, claim 1 as amended clarifies that, within the 3D environment, the location of the planar guide changes “as the practitioner moves an orthodontic appliance relative to a digital representation of a tooth.” It is clear that claim 1 requires the planar guide to be displayed as a different object than a digital representation of a tooth and that the location of the planar guide within the 3D environment is dependent on the position of an orthodontic appliance and changes when the practitioner moves the appliances.

Independent claim 4 specifies that displaying the planar guide comprises receiving input from the practitioner moving the orthodontic appliance with respect to the tooth within the 3D environment, and automatically moving the planar guide within the 3D environment as the practitioner moves the orthodontic appliance with respect to the tooth within the 3D environment. Claim 4 also clarifies that the planar guide is a different object than a digital representation of a tooth because the planar guide is moved within the 3D environment *as the orthodontic appliance is moved relative to the tooth*, which is displayed separately from the planar guide.

In contrast to the vector images of the teeth disclosed by Chapoulaud, the invention recited in independent claims 1 and 4 aids a practitioner in the placement of an orthodontic object relative to a tooth of a dental arch within a 3D environment by displaying both the tooth and the

³² *Id.* at paragraphs [0083] and [0091].

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planar guide. Because the location of the planar guide changes as the practitioner moves an orthodontic appliance relative to the tooth, the planar guide helps provide a good visual indication of the position of the orthodontic appliance relative to another displayed object, i.e., the tooth.³³ Chapoulaud, however, fails to disclose displaying a separate tooth and a planar guide and also fails to teach or suggest *as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location that is based on a position of the orthodontic appliance within the 3D environment*. Accordingly, Chapoulaud does not disclose the invention of Applicant's independent claims 1 and 4.

For example, in Chapoulaud a user "can adjust the torque, tip and rotation, of the brackets" and "the finish positions [of the teeth] can be recalculated and the recalculated positions displayed."³⁴ Thus, the finish position of the vector image of the teeth, i.e., the "planar guide" as characterized by the Office Action, is recalculated based on adjustments made to the bracket. Because Chapoulaud displays vector images of the teeth and does not display a planar guide that is separate from a digital model of the teeth, Chapoulaud cannot disclose or even suggest that a planar guide is moved as a practitioner moves an orthodontic appliance relative to a digital representation of a tooth because, as interpreted by the Office Action, the planar guide is the digital representation of the tooth. That is, Chapoulaud cannot disclose or suggest moving a planar guide within a 3D environment as the practitioner moves an orthodontic appliance with respect to a tooth that is displayed separately from the planar guide.

For at least the reasons discussed above with respect to independent claim 1, the cited references fail to disclose or suggest a system comprising a computing device, and modeling software executing on the computing device, where the modeling software comprises a rendering engine that renders a digital representation of a tooth of a dental arch within a three-dimensional (3D) environment, and a user interface that displays the digital representation of the tooth of the dental arch while displaying a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in a placement of an orthodontic appliance relative to the dental arch within the 3D environment, where the rendering engine displays the planar guide separately from the digital representation of the tooth, and wherein, as the practitioner moves the orthodontic

³³ See, e.g., Applicant's originally-filed disclosure at paragraph [0008].

³⁴ *Id.* at paragraph [0091].

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appliance relative to the tooth within the 3D environment, the rendering engine renders the planar guide at a location based on a position of the orthodontic appliance within the 3D environment, as required by Applicant's independent claim 39 as amended.

In addition, for at least the reasons discussed above with respect to independent claim 1, Chapoulaud also fails to disclose or suggest each and every limitation of independent claim 75 as amended. Claim 75 recites a computer-readable medium comprising instructions for causing a programmable processor to render a digital representation of a tooth within a three-dimensional (3D) environment, and, while displaying the digital representation of the tooth, display a two-dimensional planar guide within the 3D environment as a visual aid to a practitioner in the placement of an orthodontic appliance relative to the tooth within the 3D environment, where the planar guide is displayed separately from the digital representation of the tooth, and where the instructions cause the programmable processor to display the planar guide by, as the practitioner moves the orthodontic appliance relative to the tooth within the 3D environment, rendering the planar guide at a location based on a position of the orthodontic appliance within the 3D environment.

Dependent Claims 2, 3, 5-38, 40-74, and 76-82

Claims 2, 3, 5-38, 40-74, and 76-82 depend from one of independent claims 1, 4, 39, and 75, and are patentable over the cited references for at least the reasons given above with respect to the independent claims. Claims 2, 3, 5-38, 40-74, and 76-82 recite additional limitations that are neither disclosed nor suggested by Chapoulaud or the other cited art.

For example, the cited references fail to disclose or suggest each and every limitation of claim 2, which depends from claim 1. Claim 2 as amended recites a method that comprises displaying a planar guide proximal to a surface of the digital representation of the tooth of the dental arch to aid the practitioner in placement of the orthodontic appliance on the tooth. The amendment to claim 2 is fully-supported by Applicant's disclosure, such as at paragraph [0039], which describes a surface of a tooth that lies proximal to a planar guide. As indicated above, FIG. 5G of Chapoulaud illustrates vector images of teeth, which cannot reasonably be characterized as planar guides that are displayed separately from digital representations of teeth. Even if the vector image of teeth in Chapoulaud are considered to be planar guides, an assertion

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with which Applicant disagrees, the “planar guides” are not displayed proximal to surfaces of digital representation of a teeth that are displayed separately from the planar guides. Accordingly, the vector images of the teeth disclosed by Chapoulaud cannot be the planar guide recited in claim 2. For similar reasons, cited references fail to disclose or suggest each and every limitation of claim 41, which depends from claim 39, and recites a guide control module locates the planar guide proximal to a surface of a digital representation of the tooth of the dental arch within the 3D environment.

With respect to dependent claims 5-9, 11, 44-48, and 50, which specify different types of planar guides, such as a mesial planar guide, a distal planar guide, an occlusal planar guide, a midlateral planar guide, a midfrontal planar guide, a midsagittal planar guide, and a gingival planar guide, the Office Action reasoned that “it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the planar guides represent other visual locations of a bracket relative to a tooth.”³⁵ Applicant respectfully disagrees. The “planar guides” that the Office Action alleges are disclosed by Chapoulaud are vector images of the teeth.³⁶ There is no apparent reason why one skilled in the art would change the vector image of the teeth to “represent other visual locations of a bracket relative to a tooth” as alleged by the Office Action.

In Chapoulaud, the vector image of a tooth is in a particular location because the vector image is “formed of a long axis plane LAP with the crown long axis CLA located therein . . . and the various tooth landmarks of the tooth located in reference to the plane and the CLA.”³⁷ The long axis plane (LAP) and the crown long axis (CLA) of the tooth are defined by a user.³⁸ Chapoulaud only illustrates one representation of a “vector” image of a tooth, and does not even contemplate different types of vector images. Furthermore, Chapoulaud does not disclose that the vector image of the tooth is used to show a particular “visual location of a bracket relative to a tooth,” so there is no reasonable basis for the rationale proposed by the Office Action to modify Chapoulaud to include the types of planar guides recited in Applicant’s claims 5 -9, 11, 44-48, and 50.

³⁵ Office Action at p. 4, item 8.

³⁶ Chapoulaud at paragraph [0091].

³⁷ *Id.* at paragraph [0083].

³⁸ *Id.* at paragraphs [0082]-[0084].

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Dependent claim 26, which depends from claim 1, recites a method comprising automatically scaling the planar guide within the 3D environment to size the planar guide based on one or more dimensions of the tooth of the dental arch. Similarly, dependent claim 62, which depends from claim 39, recites a system comprising a guide control module that automatically scales the planar guide within the 3D environment to size the planar guide based on one or more dimensions of a tooth within the dental arch, where the tooth is displayed in addition to the planar guide. With respect to the rejection of claims 26 and 62, the Office Action reasoned that “[i]t would have been obvious to one of ordinary skill in the art to size or scale the planar guides [disclosed by Chapoulaud] with respect to the displayed tooth or teeth.”³⁹ Applicant respectfully disagrees. The Office Action characterized a vector image of a tooth as a planar guide. It is unclear why or even how one skilled in the art would size or scale the vector image of the tooth with respect to a displayed tooth when the vector image of the tooth is itself the displayed tooth. Chapoulaud fails to disclose or even suggest a planar guide that is separate from any representation of a tooth. Accordingly, in Chapoulaud, the vector image of the tooth cannot be a planar guide that is scaled based on the dimension of a separate tooth that is displayed with a planar guide, as required by claim 26.

Dependent claim 37 as amended, which depends from claim 1, recites a method comprising displaying contour lines on the planar guide, wherein each contour line indicates a constant distance to a surface of the tooth within the 3D environment relative to the planar guide. Similarly, dependent claim 73 as amended, which depends from claim 39, recites a system comprising a user interface that displays contour lines on the planar guide, wherein each contour line indicates a constant distance to a surface of the tooth within the 3D environment relative to the planar guide. In support of the rejection of the claims, the Office Action stated that, “[a] parallel object can be placed in the three-dimensional space such that it is a constant distance to the displayed contour lines on the guide.” However, this rationale fails to demonstrate how Chapoulaud discloses or suggests contour lines on a planar guide. The vector image of a tooth disclosed by Chapoulaud, which the Office Action characterized as a “planar guide,” does not include any contour lines.

³⁹ Office Action at pp. 4-5, item 8.

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In addition, as emphasized above, the vector image of the tooth shown in FIG. 5G of Chapoulaud is the digital model of the tooth itself. Thus, the vector image of the tooth cannot indicate a distance to a surface of a tooth within the 3D environment, where the tooth is separately displayed from a planar guide.

For at least these reasons, the Examiner has failed to establish a *prima facie* case for non-patentability of Applicant's claims 1-82 under 35 U.S.C. §§ 102(b) and 103(a). Withdrawal of this rejection is requested.

New Claims

Applicant has added claims 83-86 to the pending application. The applied references fail to disclose or suggest the inventions defined by Applicant's new claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed inventions. As one example, the reference fails to disclose or suggest an occlusal planar guide that penetrates an occlusal surface of a digital representation of a tooth, as recited by claim 84. Support for claims 83-86 can be found throughout Applicant's disclosure as originally-filed, including FIG. 5 and paragraph [0057]. No new matter has been added by the new claims.

CONCLUSION

All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

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